NOVEMBER/DECEMBER 2025

FACS42/CACS42— STATISTICAL METHODS AND THEIR APPLICATIONS II

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. The normal equations for a straight line $y = ax + b$ are?

2. What is Least Square Method?

3. Define Probability.

4. The sample space for rolling a die will be?

5. What is meant by binomial distribution?

6. Calculate the probability density function of normal distribution using the following data.

   $x = 3$, $\mu = 4$ and $\sigma = 2$.

7. State Confidence or Fiducial Limits and Confidence Interval.

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8. What is Degree of Freedom?

9. Expand CRD.

10. What is Replication?

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SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Fit a Straight line for the following data

x	1	2	3	4	5
y	2	5	3	8	7

Or

(b) Fit a curve of the form $y = a \cdot x^b$ for the following data.

x	1	2	4	5	7	10
y	2.1	4.9	20.8	32.7	60	131

12. (a) A person has undertaken a job. The probabilities of completion of the job on time with and without rain are 0.44 and 0.95 respectively. If the probability that it will rain is 0.45, then determine the probability that the job will be completed on time.

Or

19. The blood pressure of 5 women before and after intake of a certain drug are given below:

Before	110	120	125	132	125
After	120	118	125	136	121

Test whether there is significant change in blood pressure at 1% los?

20. A company is considering three different covers for boxes of a brand of cereal. Box type A has picture of a sports hero eating the cereal, type B has a picture of a child eating the cereal, and type C has a picture of a bowl of the cereal. The company wants to determine which cereal box type provides for the most sales. Eighteen test markets were selected by the company and each box type was randomly assigned to six markets. The number of boxes of this cereal sold per 10000 population in a specified period is recorded for each test market. The data are as follows:

TYPE A	52.4	47.8	52.4	51.3	50	52.1
TYPE B	50.1	45.2	46	46.5	47.4	46.2
TYPE C	49.2	48.3	49	47.2	48.6	48.2

Test whether there is any significant difference in the mean of three means.

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(b) Let X be a discrete random variable with the following probability distribution

x	-3	6	9
$P(X = x)$	1/6	1/2	1/3

13. (a) If a coin is tossed 5 times, find the probability of:

(i) Exactly 2 heads (ii) At least 4 heads

Or

(b) Write the Properties of Normal Distribution.

14. (a) A random sample of 16 values from a normal population showed a mean of 41.5 inches and the sum of squares of deviations from this mean = 135 sq. inches. Obtain the 95 % and 99 % confidence limits for population mean.

Or

(b) A random sample of size 16 values from a normal population showed a mean of 53 and sum of squares of deviations from the mean equals to 150 . Can this sample be regarded as taken from the population having 56 as mean? Obtain 95% confidence limits of the mean of the population.?

15. (a) A seed company performs an experiment to compare four varieties of rice. Five fields are available for the study and each field is subdivided into four plots of equal size. Each variety is randomly assigned to a plot, and the yield in bushels is recorded as follows:

		Fields				
		1	2	3	4	5
Variety of rice	1	45	37	41	48	32
	2	47	41	38	46	37
	3	53	47	50	56	45
	4	38	32	40	43	29

Test whether there is any significant difference in the yield mean according to variety of rice and fields.

Or

(b) Five levels of fertilizers were tried in a 5 ×5 Latin square to see its effect on the yield of wheat. The yield are given below in kg. per plot along with the layout:

B 37.0	C35.9	E30.9	A28.2	D35.8
D 37.3	E 38.3	A 26.9	B 36.6	C 37.6
C 34.8	A 27.4	B 34.2	D 37.4	E 34.4
E 31.3	B 38.4	D 38.0	D 39.4	A 30.3
A 24.2	D 38.0	C 36.8	E 30.8	B 34.5

Test whether there is any significant difference in the means due to 3 factors i.e, row, column and treatment (fertilizer).

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SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Fit a curve of the form $y = ae^{bx}$ for the following data.

x	0	2	4	6	8
y	3	55	1095	22000	442000

17. A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are drawn and are found to be both hearts. find the probability of the lost card being a heart.

18. A fair coin is tossed 10 times, what are the probability of getting exactly 6 heads and at least six heads.